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New Possibilities for Velocity Measurements and Model Experiments in Liquid Metal Processing

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A serious deficit in technologies involving liquid metals or semiconductor melts consists in the difficult access to velocity measurements. We report on a new level of velocity resolutions in model experiments with liquid metals, and on various magnetic field solutions for a tailored flow control. Potential difference probes (PDP) as well as the Ultrasonic Doppler Velocimetry (UDV) have been deployed in flows driven by an alternating respectively rotating magnetic field. With the PDP it was possible to resolve velocities as low as in the laminar regime. Not thus sensitive but delivering spatio-temporal data from the velocity field as a complete profile along the sound beam, the UDV measurements permit mapping of the mean flow distribution and the turbulence degree. Further, UDV was proven to suffice for a spectral decomposition of the velocity fluctuations in the case of the alternating magnetic field driven flow.

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